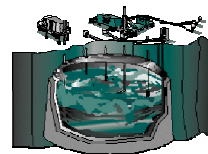




Field Raman Spectrograph for Environmental Analysis



Developer: EIC Laboratories, Inc.
Contract Number: DE-AC21-92MC29108
Crosscutting Area: CMST

Tanks
FOCUS AREA

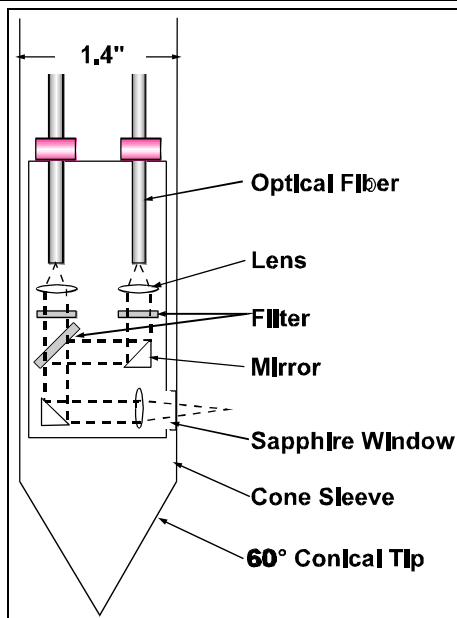
Problem:

Instrumentation for on-site use is needed to provide highly specific in situ chemical characterization and mapping of a wide variety of wastes, corrosion products, and pollutants that are located in storage tanks, soils, and ground and surface waters at Department of Energy (DOE) sites. The history of many of the contamination sources is unknown, thus making plans for environmental restoration difficult. Concentrated wastes tend to be heterogenous and cannot currently be characterized unless multiple samples are taken.

Solution:

A field-hardened Raman Spectrograph has been designed which can be used to obtain "chemical fingerprints" of concentrated and dilute hazardous waste contaminants in storage tanks, soil, and water. The instrument is a portable, small, analytical device capable of in situ measurements that can identify compounds more than 50 meters away from the spectrometer via fiber optic probes. The system is designed to be suitable for detection of highly concentrated materials and in specially designed probes, for Parts-per-billion levels.

Benefits:



► In situ detection, characterization, and mapping of previously unknown concentrated wastes.

► Detection of corrosion on the interior surface of storage tanks which would indicate areas of weakness or leakage.

► Characterization of dilute waste plumes which require more sensitive analytical methods.

► Reduction of costs of site characterization by eliminating the need for expensive processing of samples removed from the waste site.

► Near real-time on-site identification of contaminants as compared to off-site labs.

► More complete and cost-effective site mapping than is possible with drilled and excavated wells.

Technology:

The overall purpose of this project is to develop and field demonstrate a portable Raman spectrograph and associated sampling accessories that can be used in the field for screening, monitoring, and identification of a wide variety of contaminants. This instrumentation development project combines fiber optics, Raman Spectroscopy, Echelle grating, lasers, micro-optical lenses, charged-coupled devices, and fiber-optically coupled deployable probe heads.

The optics allow measurements to be made from more than 50 meters between the Raman instrument and probe head. The unit is designed to be capable of operating using modest power from a portable generator and could be integrated into an instrument platform.

Key features of the project will be the fabrication of a fully fieldable spectrometer based on a breadboard



version developed under an earlier DOE-sponsored project, development of an extensive library of DOE contaminants, and a field demonstration at Savannah River Site.

Contacts:

EIC Laboratories Inc., is active in the area of Raman instrumentation development and application for DOE, the Office of Naval Research, and the U.S. Army. For information on this project, the contractor contact is:

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DOE's Federal Energy Technology Center supports the Environmental Management - Office of Science and Technology by contracting the research and development of new technologies for waste site characterization and cleanup. For information regarding this project, the DOE contact is:

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